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- Assessment of Water Quantity
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Section 5

Assessments of Water Quantity and Quality

This section provides an evaluation of the current conditions in the Oconee River basin in terms of both water quantity (Section 5.1) and water quality (Section 5.2) issues. The assessment results are then combined with the evaluation of environmental stressors from Section 4 to produce a listing of Concerns and Priority Issues in Section 6.

5.1 Assessment of Water Quantity

5.1.1 Municipal and Industrial Water Uses

As noted in Section 3.2, Municipal and Industrial (M&I) water use projections are not available for the entire Oconee basin, but they have been calculated for the growing area around Athens. According to Athens-Clarke County estimates, total municipal and industrial water demand for Clarke, Barrow, Jackson, and Oconee Counties is projected to increase from 29.54 MGD in 2000 to 63.23 MGD by 2050. As stated in Section 2.1.4, the Upper Oconee basin Water Authority has proposed a 52-MGD reservoir to supply water to the four-county region. This reservoir, the Bear Creek Regional Reservoir, is under development and is expected to begin selling water by mid-2001. The reservoir will cover 505 acres and hold 14,980 acre-feet of water at normal pool, and it is expected to satisfy water needs for the four counties through the year 2050.

Overall Surface Water Quality

Overall the surface water quality in the Oconee River basin is good for use as drinking water. All public water systems in the state of Georgia that use surface water meet the federal Surface Water Treatment Rules for filtration and treatment. However, surface water quality problems due to nonpoint source pollution such as agricultural and storm water runoff are concerns to municipalities that withdraw surface water from the Oconee River and tributaries. The contaminant of most concern is high turbidity due to erosion and sediment runoff. Water high in turbidity can clog filters, interrupt the proper treatment of raw water, and increase the cost of the water to the consumers because more chemicals must be applied to settle out the sediment. Many water plants have reservoirs to store larger amounts of water and to settle out excess sediment (turbidity). In some

cases, taste and odor problems are associated with algae blooms in reservoirs, or with elevated concentrations or iron and manganese, which can arise when an anoxic, reducing environment exists in the bottom water of reservoirs. Table 5-1 summarizes the known and potential raw water quality problems affecting drinking water supplies associated with surface water intakes within the Oconee basin.

Overall Ground Water Quality

Overall ground water quality is very good for use as drinking water from wells. Since most wells used in public water systems are constructed by licensed well drillers and draw from deeper aquifers, the number of contaminated wells is small. However, in the Oconee basin some public water system wells have been contaminated by local pollution sources such as leaking underground storage tanks, malfunctioning septic tank systems, and spills. If a well exceeds the Maximum Contaminant Level (MCL) for a contaminant, it is removed from service or additional treatment is added to the system. Also, a few springs in the basin have been found to be under the direct influence of surface water due to the geology of the area in which they are located. These springs are monitored and have additional treatment requirements.

5.1.2 Agriculture

Agricultural water demand is significant in the Oconee River basin. In 1995, water usage by animal operations was estimated at 3.8 billion gallons per year; crops and orchards, 4.0 billion gallons per year. For purposes of comparison, average annual flow in the Oconee River is over 1 trillion gallons per year (see Section 3.2.1). It is estimated that in 1995 there were 19,739 acres of irrigated land in the basin and 158,000 beef cattle, 140 million broilers, and 61,000 head of swine (estimates based on UGA-CES Georgia County Guide, 1996 Edition).

5.1.3 Recreation

Water-based recreation in the Oconee basin is primarily dependent on sufficient water flow in the streams to support boating, fishing, and water sports. It is unlikely that there will be any significant effect on these activities due to unavailability of water, with the possible exception of short-term stream flow changes during droughts when agricultural irrigation is very high.

5.1.4 Hydropower

Lake Oconee and Lake Sinclair are two major hydropower facilities, both operated by the Georgia Power Company. Wallace Dam has a generating capacity of 321 megawatts and impounds Lake Oconee, a 21,000-acre reservoir. The water released by Wallace Dam flows into Lake Sinclair, a 15,330-acre reservoir impounded by Sinclair Dam, with a generating capacity of 45 megawatts. Neither of these reservoirs has sufficient depth to provide meaningful storage volume for flood control.

5.1.5 Navigation

As noted in Section 3.2, there are no sections of the Oconee River or its tributaries for which the federal government maintains a navigation channel.

Table 5-I. Known and Potential Raw Water Quality Problems Affecting Drinking Water Supplies in the Oconee Basin

Oconee River above Lake Sinclair Dam (HUC 03070101)

Water System Name	Water Source Name	Number of Intakes	Reservoir that allow for WQ	Number of Water Plants	Known Raw Water Quality Problems in the Past and Potential Future Problems	Other Comments
City of Jefferson 1570003	Curry Creek	1	Y	1	Problems with algae blooms in reservoir due to runoff from upstream private ponds and poultry operations. Had to implement reservoir treatment. County has no local poultry ordinances. Shallow source subject to flashing and has natural occurrence of iron and manganese. Potential development upstream of intake.	Water system in compliance. Plant needs some upgrades. Partner in Upper Oconee Reservoir Project. City and county need to increase communication with agricultural interests upstream regarding runoff.
City of Winder 0130002	Cedar Creek	1	Y	2	Spring-fed creek flows through heavy urban and industrial area. Known problems with some industrial runoff, specifically soap suds. Major transportation corridors, CSX railroad, and Hwy 8 could pose significant potential pollution sources. Used to be primary source but city now relies on Fort Yargo Lake.	Water system in compliance. Plant located on Hwy 53 is older but recently upgraded. City needs to implement a better plan to handle backwash discharge to Fort Yargo Lake so that turbidity is not increased. Also, city needs to improve communication with local industries that might impact Cedar Creek.
	Fort Yargo Lake	1	Y		Source located in Fort Yargo State Park has well-protected watershed. New Hwy 8 plant has no discharge permit and backwash from plant is discharging into the lake. Discharge could become significant potential pollution source by increasing turbidity in the lake.	
	Mulberry River	1	N		Some development in watershed and major transportation corridor, I-85. Some erosion and sedimentation problems.	

Water System Name	Water Source Name	Number of Intakes	Reservoir that allow for WQ	Number of Water Plants	Known Raw Water Quality Problems in the Past and Potential Future Problems	Other Comments
City of Athens - Clarke County 0590000	Sandy Creek (Inactive)	1	N	1	Inactive intake.	Water system in compliance. Plant in good condition. Currently undergoing plant expansion. Partner in Upper Oconee Reservoir Project. Unified government needs to work with developer of land near Middle Oconee intake to implement erosion and sedimentation practices to ensure minimum impact on water near intake.
	North Oconee River	1	Y		Intake pumps directly to plant and reservoir. Potential pollution sources from transportation corridors (Athens Bypass), urban development, local industrial runoff, and poultry operations upstream. Naturally occurring manganese sometimes a problem.	
	Middle Oconee River	1	Y		Intake impacted from runoff development. Occasionally, color problem caused by overflow of dye discharging from textile mill upstream in different county. Intake located at shallow area of river where natural sand buildup requires constant dredging. Potential pollution source from erosion and sedimentation runoff located in close proximity (100 yards) to intake. Adjacent area recently sold and being developed into homes.	
City of Statham 0130001	Barber Creek Reservoir	1	N	1	Shallow source in a swampy area. Past problem with taste and odor and extremely high iron and manganese due to shallow source. Problems with flashing due to erosion and sedimentation problems caused by increased residential and commercial development in drainage area. Heavy flashing problem has made water difficult to treat by package plant.	Package plant water system in compliance. Although system is only 4 years old, it was briefly out of compliance due to lack of maintenance, lack of certified personnel, and problems with treating water. System uses backup connection to Winder during heavy flashing periods. Partner in Upper Oconee Reservoir Project. City needs to look at other short-term options for providing drinking water. City needs to work with developers to implement erosion and sedimentation BMPs and improve treatment plant.

Water System Name	Water Source Name	Number of Intakes	Reservoir that allow for WQ	Number of Water Plants	Known Raw Water Quality Problems in the Past and Potential Future Problems	Other Comments
City of Madison 2110002	Hard Labor Creek	1	N	2	Shallow source subject to flashing. Intake subject to occasional silting and sand buildup.	Water system in compliance. Overall in good condition but needs more staff.
	Speeds Branch	1	N		Inactive intake.	
	Lake Oconee	1	Y		New intake and plant being developed to be on line by end of 1998.	
City of Greensboro 1330000	Lake Oconee	1	Y	1	Lake has high turbidity after heavy rain, erosion and sedimentation runoff due to residential development around the lake. Also potential pollution sources from transportation corridors (Hwy 278).	Water system in compliance. Overall in good condition but needs more staff.
City of Monticello 1590000	Lowery Branch	1	N	1	Drainage area is primarily pasture and agricultural, but overall water quality good.	Water system in compliance. Overall in good condition.
	Pope's Branch	1	N		Well protected drainage area except transportation corridors present (Hwy 228)	
Eatonton 2370000	Little River	1	N	1	Shallow source that naturally causes taste and odor problems and algae blooms. Also problems with iron and manganese.	Water system in compliance. Plant is at full capacity and cannot support future growth. In past system has violated water withdrawal permit.
City of Sparta 1410002	Lake Sinclair	1	Y	1	Subject to flashing from agricultural runoff. Potential pollution problems from recreational use of lake and transportation corridors (I-20, Hwy 441, and Rte 16)	Water system in compliance. Overall in good condition but needs more staff. Multiple users of Lake Sinclair need to work with agricultural interests upstream to ensure proper agricultural BMPs are being used.
	Fort Creek	1	N		Subject to flashing after heavy rain. Intake inactive.	
Georgia Power Company 2370003	Lake Sinclair	1	Y	1	Subject to flashing from agricultural runoff. Potential pollution problems from recreational use of lake and transportation corridors (I-20, Hwy 441, and Rte 16)	Water system in compliance. Overall in good condition. Multiple users of Lake Sinclair need to work with agricultural interests upstream to ensure proper agricultural BMPs are being used.

HUC 03170102 - Oconee River below Lake Sinclair Dam

Water System Name	Water Source Name	Number of Intakes	Reservoir that allow for WQ	Number of Water Plants	Known Raw Water Quality Problems in the Past	Other Comments
City of Milledgeville 0090001	Oconee River (Central State Hospital)	1	N	2	Subject to some flashing. Potential pollution problems from Georgia Power - Plant Branch, railroad river crossing 1½ mile upstream, and other transportation corridors.	Water system in compliance. Overall in good condition. Plant recent upgrades and new filters.
	Oconee River	1	N		Subject to some flashing. Potential pollution problems from Georgia Power - Plant Branch, railroad river crossing upstream and other transportation corridors.	
City of Dublin 1750002	Oconee River	1	N	1	Some silting of intake and source subject to flashing. Potential pollution problems upstream from Georgia Power - Plant Branch. Milledgeville discharges may have impact also.	Water system in compliance. Overall in good condition.

5.1.6 Waste Assimilation Capacity

Sufficient flow for assimilation of treated wastewater in the Oconee River is most critical in the Athens area. Georgia has obligations under the Clean Water Act to meet instream water quality standards, and the state places a high priority on this obligation (see Section 6.0). Only under extreme drought conditions, when sufficient water flow is not available after domestic water supply needs are met, would there be insufficient water to meet instream water quality standards.

5.1.7 Assessment of Ground Water

Ground water zones are based on underlying geology and their rock units. Ground water assessment is discussed separately for each HUC since the two defined HUCs in the Oconee basin are relatively close to defining the natural ground water divide of Piedmont crystalline rock to the north and Coastal Plain sedimentary rocks to the south.

Piedmont Region: Oconee River above Lake Sinclair Dam (HUC 03070101)

There is some use of ground water in this area, as well as limited ground water potential. Small amounts of agricultural irrigation are present in these areas, while some locations have large or expanding poultry and poultry processing operations. Such facilities can be large ground water users. These operations can also lead to contamination of the underground aquifer and nearby streams because of nitrogen loading from land application of wastes.

Within this HUC, Hall and Barrow Counties are experiencing urban growth related to the continued expansion of Atlanta. The Athens-Clarke County area is also growing rapidly. Athens has investigated the use of ground water to supplement its water supply in certain outlying areas. Such larger users might decrease aquifer levels and therefore associated water supply to the streams during dry weather. South of these urbanizing areas, ground water use is limited.

Coastal Plain Region: Oconee River below Lake Sinclair Dam (HUC 03070102)

South of the Fall Line, the rock units present in the near surface are Cretaceous to Tertiary age sand, shale, and limestone units of the coastal plain depositional environment. Most industrial or municipal users rely solely on ground water for their water supply, though in this region associated municipal growth in water use is minimal. Agricultural interests use the underlying Cretaceous aquifer heavily near the fall line, while the overlying Floridan aquifer accounts for ground water supply at the southern limit of the basin. Laurens and Montgomery Counties have large and ever-expanding agricultural users, pulling hard on the Cretaceous and Floridan aquifers.

In Twiggs, Wilkinson, and Washington Counties, the major ground water users are the kaolin mining and clay processing companies. Large amounts of ground water are withdrawn both for mine de-watering, where lowering the water table in an area is essential for the continued mining of the kaolin clay, and for kaolin processing operations, where the water is used in the clay cleaning process. Clay operations are very substantial water users. Because of the nature of the business, they also continually change the locations of their mines as kaolin is mined out. Because of this movement, this sort of water use may dramatically affect the level of water in ever-changing, but localized, spots of the aquifer.

Generally, some springs might have been reduced in the Oconee basin either through lowering of the ground water table by withdrawals, especially in the kaolin belt, or

possibly by land use changes caused by the switch from forest to agricultural lands. Currently, no major ground water problems are present in the basin.

5.2 Assessment of Water Quality

This assessment of water quality reflects Georgia's water quality assessments for reporting to EPA under Section 305(b) of the Clean Water Act. It begins with a discussion of (1) water quality standards, (2) monitoring programs, and (3) data analyses to assess compliance with water quality standards and determine use support. Following this introductory material, detailed assessment results by subbasin are presented in Section 5.2.4.

5.2.1 Water Quality Standards

Assessment of water quality requires a baseline for comparison. A statewide baseline is provided by Georgia's water quality standards, which contain water use classifications, numeric standards for chemical concentrations, and narrative requirements for water quality.

Georgia's water use classifications and standards were first established by the Georgia Water Quality Control Board in 1966. The water use classification system was applied to interstate waters in 1972 by EPD. Table 5-2 provides a summary of water use classifications and basic water quality criteria for each water use. Georgia also has general narrative water quality standards, which apply to all waters. These narrative standards are summarized in Table 5-3.

In addition to the basic water quality standards shown above, Congress made changes in the Clean Water Act in 1987 that required each state to adopt numeric limits for toxic substances for the protection of aquatic life and human health. To comply with these requirements, in 1989 the Board of Natural Resources adopted 31 numeric standards for the protection of aquatic life and 90 numeric standards for the protection of human health. Appendix B provides a complete list of the toxic substance standards that apply to all waters in Georgia. Georgia has adopted all numeric standards for toxic substances

Table 5-2. Georgia Water Use Classifications and Instream Water Quality Standards for Each Use

	Bacteria (fecal coliform)		Dissolved Oxygen (other than trout streams)[1]		pH	Temperature (other than trout streams)[1]	
Use Classification	30-Day Geometric Mean[2] (MPN/100 ml)	Maximum (MPN./100 ml)	Daily Average (mg/l)	Minimum (mg/l)	Std. Units	Maximum Rise (°F)	Maximum (°F)
Drinking Water requiring treatment	1,000 (Nov-April) 200 (May-October)	4,000 (Nov-April)	5.0	4.0	6.0-8.5	5	90
Recreation	200 (Freshwater) 100 (Coastal)	--	5.0	4.0	6.0-8.5	5	90
Fishing Coastal Fishing[3]	1,000 (Nov-April) 200 (May-October)	4,000 (Nov-April)	5.0	4.0	6.0-8.5	5	90
Wild River	No alteration of natural water quality						
Scenic River	No alteration of natural water quality						

[1] *Standards for Trout Streams for dissolved oxygen are an average of 6.0 mg/L and a minimum of 5.0 mg/L. No temperature alteration is allowed in Primary Trout Streams, and a temperature change of 2°F is allowed in Secondary Trout Streams.*

[2] *Geometric means should be "based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours." The geometric mean of a series of N terms is the Nth root of their product. Example: The geometric mean of 2 and 18 is the square root of 36.*

[3] *Standards are same as fishing with the exception of dissolved oxygen standards, which are site-specific.*

Table 5-3. Georgia Narrative Water Quality Standards for All Waters (Excerpt from Georgia Rules and Regulations for Water Quality Control Chapter 391-3-6-.03 - Water Use Classifications and Water Quality Standards)

(5) General Criteria for All Waters. The following criteria are deemed to be necessary and applicable to all waters of the State:

(a) All waters shall be free from materials associated with municipal or domestic sewage, industrial waste or any other waste which will settle to form sludge deposits that become putrescent, unsightly or otherwise objectionable.

(b) All waters shall be free from oil, scum and floating debris associated with municipal or domestic sewage, industrial waste or other discharges in amounts sufficient to be unsightly or to interfere with legitimate water uses.

(c) All waters shall be free from material related to municipal, industrial or other discharges which produce turbidity, color, odor or other objectionable conditions which interfere with legitimate water uses.

(d) All waters shall be free from toxic, corrosive, acidic and caustic substances discharged from municipalities, industries or other sources, such as nonpoint sources, in amounts, concentrations or combinations which are harmful to humans, animals or aquatic life.

(e) All waters shall be free from turbidity which results in a substantial visual contrast in a water body due to man-made activity. The upstream appearance of a body of water shall be observed at a point immediately upstream of a turbidity-causing man-made activity. The upstream appearance shall be compared to a point which is located sufficiently downstream from the activity so as to provide an appropriate mixing zone. For land-disturbing activities, proper design, installation and maintenance of best management practices and compliance with issued permits shall constitute compliance with [this] Paragraph...

promulgated by the U.S. Environmental Protection Agency (EPA). Georgia is also developing site-specific standards for major lakes where control of nutrient loading is required to prevent problems associated with eutrophication.

5.2.2 Surface Water Quality Monitoring

EPD's monitoring program integrates physical, chemical, and biological monitoring to provide information for water quality and use attainment assessments and for basin planning. EPD monitors the surface waters of the state to:

- collect baseline and trend data,
- document existing conditions,
- study impacts of specific discharges,
- determine improvements resulting from upgraded water pollution control plants,
- support enforcement actions,
- establish wasteload allocations for new and existing facilities,
- verify water pollution control plant compliance,
- document water use impairment and reasons for problems causing less than full support of designated water uses, and
- develop Total Maximum Daily Loads.

EPD uses a variety of monitoring tools to collect information to determine if the waterbodies are supporting its designated uses. These tools include trend monitoring, intensive surveys, lake, coastal, biological, fish tissue, and toxic substance monitoring,

and facility compliance sampling. Each of these is briefly described in the following sections.

Trend Monitoring

During the late 1960s, EPD initiated long-term monitoring of streams at strategic locations throughout Georgia, called trend or ambient monitoring. This work is primarily accomplished through cooperative agreements with federal, state, and local agencies that collect samples from groups of stations at specific, fixed locations throughout the year. The cooperating agencies conduct certain tests in the field and send stream samples to EPD for additional laboratory analyses. Although there have been a number of changes over the years, routine chemical trend monitoring is still accomplished through similar cooperative agreements.

Today EPD contracts with the United States Geological Survey (USGS) for the majority of the trend sampling work. In addition to monthly stream sampling, a portion of the work with the USGS involves continuous monitoring at several locations across the state. EPD associates also collect water and sediment samples for toxic substance analyses, as well as macroinvertebrate samples to characterize the biological community at selected locations as a part of the trend monitoring effort. WRD associates also assess fish communities as a part of the monitoring effort. Additional samples used in the 1996-1997 assessment were collected by other federal, state, and local governments, universities, contracted Clean Lakes projects, and utility companies. Trend monitoring stations located in the Oconee basin in 1994 are shown in Figure 5-1.

Changes in Trend Monitoring Stations

In 1995, EPD adopted and implemented significant changes to the strategy for trend monitoring in Georgia. The changes were implemented to support the River Basin Management Planning program. The number of fixed stations statewide was reduced in order to focus resources for sampling and analysis in a particular group of basins in any one year in accordance with the basin planning schedule. Sampling focus was placed on the Oconee, Coosa, and Tallapoosa basins during the 1996 sampling.

Figure 5-2 shows the focused trend monitoring network for the Oconee basin used in 1996. During this period statewide trend monitoring was continued at the 37 core station locations statewide, in the Savannah Harbor, in the Chattahoochee at Atlanta and Columbus, and at continuous monitoring locations. The remainder of the trend monitoring resources were devoted to the Oconee, Coosa, and Tallapoosa basins. As a result, more sampling was conducted in the focus river basins. Increasing, the resolution of the water quality monitoring improves the opportunity to identify impaired waters, as well as the causes of impairment.

Intensive Surveys

Intensive surveys complement long-term fixed station monitoring to focus on a particular issue or problem over a shorter period of time. Several basic types of intensive surveys are conducted, including model calibration surveys and impact studies. The purpose of a model calibration survey is to collect data to calibrate a mathematical water quality model. Models are used for wasteload allocations and/or TMDLs and as tools for use in making regulatory decisions. Impact studies are conducted where information on the cause-and-effect relationships between pollutant sources and receiving waters is needed. In many cases biological information is collected along with chemical data for use in assessing environmental impacts.

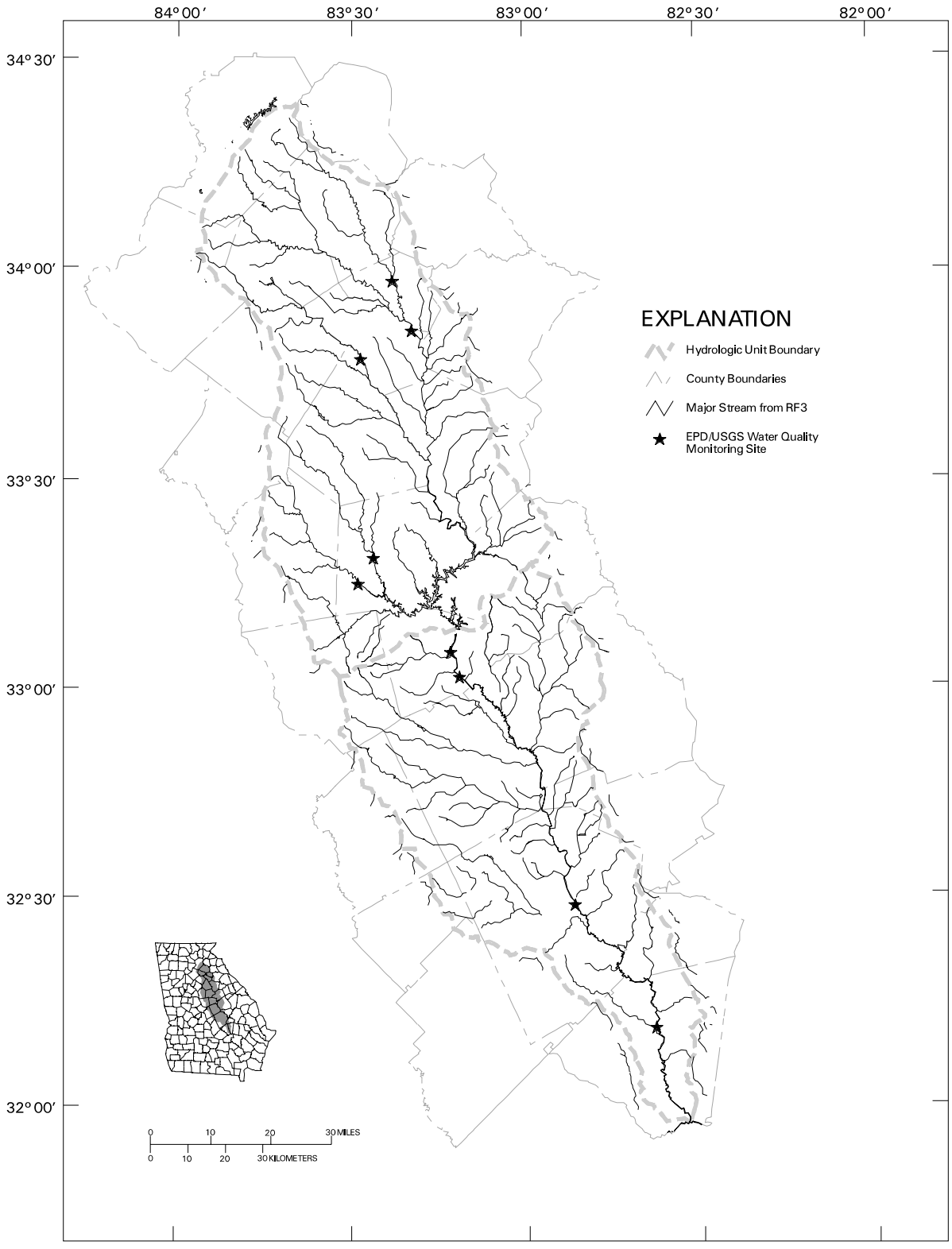

Figure 5-I. Oconee Basin Fixed Sampling Station Locations

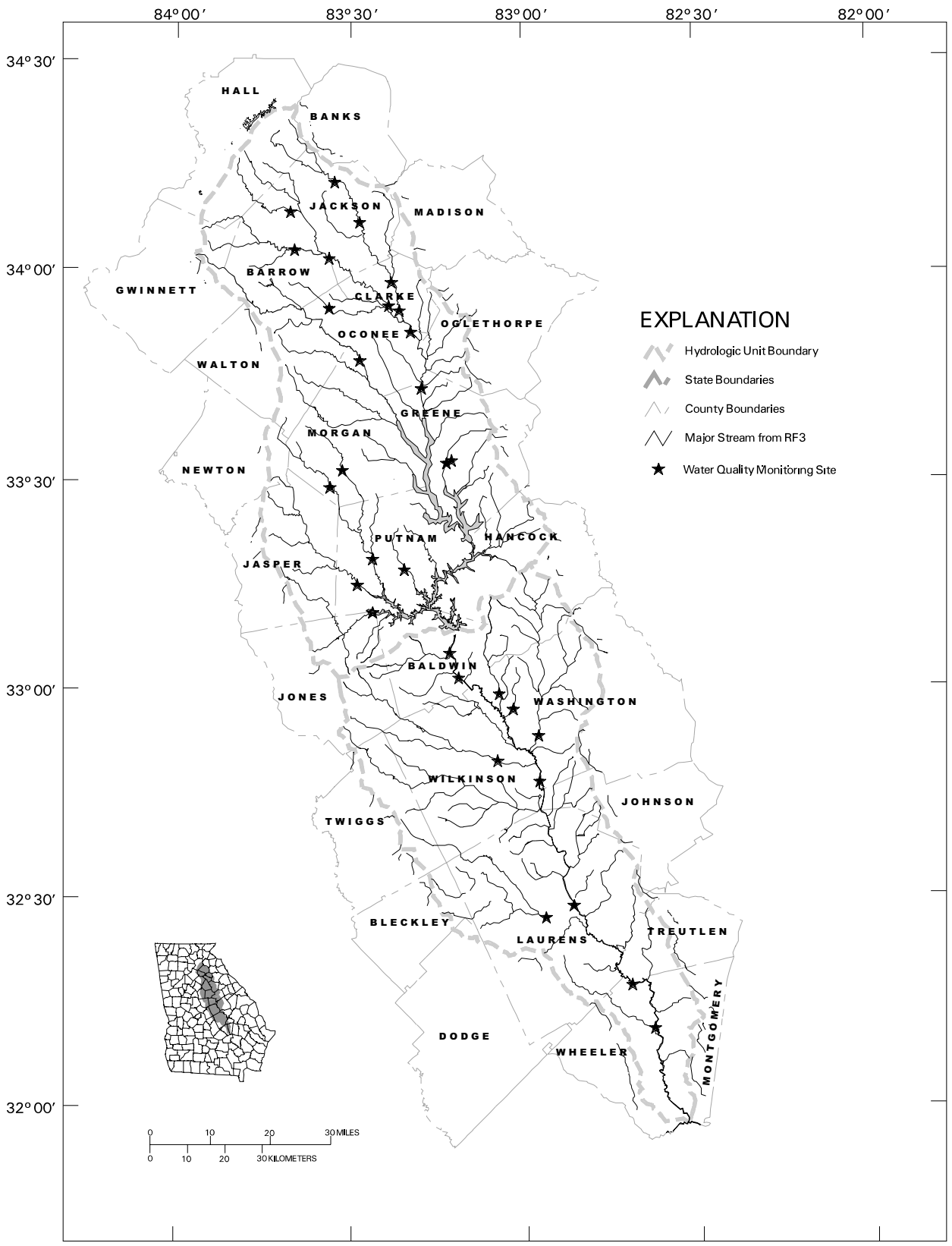

Figure 5-2. Oconee Basin Trend Monitoring Network Station Locations, 1996

Lake Monitoring

EPD has maintained monitoring programs for Georgia's public access lakes for many years. In the late 1960s, a comprehensive statewide study was conducted to assess fecal coliform levels at public beaches on major lakes in Georgia as the basis for water use classifications and establishment of water quality standards for recreational waters. In 1972, EPD staff participated in the USEPA National Eutrophication Survey, which included 14 lakes in Georgia. A postimpoundment study was conducted for West Point Lake in 1974. Additional lake monitoring continued through the 1970s. The focus of these studies was primarily problem/solution-oriented and served as the basis for regulatory decisions.

Trophic Condition Monitoring

In 1980-1981, EPD conducted a statewide survey of public access freshwater lakes. The study was funded in part by USEPA Clean Lakes Program funds. The survey objectives were to identify freshwater lakes with public access, assess each lake's trophic condition, and develop a priority listing of lakes as to need for restoration and/or protection. In the course of the survey, data and information were collected on 175 identified lakes in 340 sampling trips. The data collected included depth profiles for dissolved oxygen, temperature, pH, specific conductance, and Secchi disk transparency and chemical analyses for chlorophyll *a*, total phosphorus, nitrogen compounds, and turbidity. The three measures of Carlson's Trophic State Index were combined into a single total trophic state index (TTSI) and used with other field data and observations to assess the trophic condition of each lake. Higher values of the TTSI represent more eutrophic, less desirable conditions. Monitoring efforts have continued since the 1980-1981 Lake Classification Survey with a focus on major lakes (those with a surface area greater than 500 acres), and the TTSI has continued to be employed as a tool to mark trophic state trends. The major lakes in the Oconee basin are listed in Table 5-4 and are ranked according to the TTSI for the period 1984-1993. The monitoring project for major lakes was suspended in 1994 due to a lack of field and laboratory resources. The work on major lakes in the future will be a part of the River Basin Management Planning process.

Table 5-4. Major Lakes in the Oconee River Basin Ranked by Sum of Trophic State Index Values, 1980-1993

1984		1985		1986		1987		1988	
Sinclair	173	Sinclair	188	Oconee	161	Sinclair	<154	Oconee	164
Oconee	154	Oconee	169	Sinclair	152	Oconee	<145	Sinclair	<152
range for state:	120-205	*range for state:*	116-188	*range for state:*	114-177	*range for state:*	<108-184	*range for state:*	111-178
1989		**1990**		**1991**		**1992**		**1993**	
Sinclair	169	Sinclair	182	Oconee	161	Sinclair	172	Sinclair	172
Oconee	165	Oconee	166	Sinclair	150	Oconee	163	Oconee	172
range for state:	123-209	*range for state:*	118-182	*range for state:*	121-193	*range for state:*	131-194	*range for state:*	122-195

Note: Higher values represent more eutrophic conditions.

Fish Tissue Monitoring

The DNR conducts fish tissue monitoring for toxic chemicals and issues fish consumption guidelines as needed to protect human health. It is not possible for the DNR to sample fish from every stream and lake in the state. However, high priority has been placed on the 26 major reservoirs that make up more than 90 percent of the total lake acreage. These lakes will continue to be sampled as part of the River Basin Management Planning 5-year rotating schedule to track trends in fish contaminant levels. The DNR

has also made sampling fish in rivers and streams downstream of urban and/or industrial areas a high priority. In addition, DNR will focus attention on areas which frequented by a large number of anglers.

The program includes testing of fish tissue samples for the substances listed in Table 5-5. Of the 43 constituents tested, only PCBs, chlordane, and mercury have been found in fish at concentrations that could create risk to human health from fish consumption.

The test results have been used to develop consumption guidelines, that are updated annually and provided to fishermen when they purchase fishing licenses. This program will continue and will be coordinated as a part of the River Basin Management Planning process in the future.

Table 5-5. Parameters for Fish Tissue Testing

Antimony	a-BHC	Heptachlor
Arsenic	b-BHC	Heptachlor Epoxide
Beryllium	d-BHC	Toxaphene
Cadmium	g-BHC (Lindane)	PCB-1016
Chromium, Total	Chlordane	PCB-1221
Copper	4,4-DDD	PCB-1232
Lead	4,4-DDE	PCB-1242
Mercury	4,4-DDT	PCB-1248
Nickel	Dieldrin	PCB-1254
Selenium	Endosulfan I	PCB-1260
Silver	Endosulfan II	Methoxychlor
Thallium	Endosulfan Sulfate	HCB
Zinc	Endrin	Mirex
Aldrin	Endrin Aldehyde	Pentachloroanisole
		Chlorpyrifos

Toxic Substance Stream Monitoring

EPD has focused resources on the management and control of toxic substances in the state's waters for many years. Toxic substance analyses have been conducted on samples from selected trend monitoring stations since 1973. Wherever discharges were found to have toxic impacts or to include toxic pollutants, EPD has incorporated specific limitations on toxic pollutants in NPDES discharge permits.

In 1983 EPD intensified toxic substance stream monitoring efforts. This expanded toxic substance stream monitoring project includes facility effluent, stream, sediment, and fish sampling at specific sites downstream of selected industrial and municipal discharges. From 1983 through 1991, 10 to 20 sites per year were sampled as part of this project. During the recent years, this effort was reduced significantly due to use of limited laboratory resources for different types of analysis. Future work will be conducted as a part of the River Basin Management Planning process.

Facility Compliance Sampling

In addition to surface water quality monitoring, EPD conducts evaluations and compliance sampling inspections of municipal and industrial water pollution control plants. Compliance sampling inspections include the collection of 24-hour composite

samples, as well as an evaluation of the permittee's sampling and flow monitoring requirements.

More than 270 sampling inspections were conducted by EPD staff statewide in 1996-1997. The results were used, in part, to verify the validity of permittee self-monitoring data and as supporting evidence, as applicable, in enforcement actions. Also, sampling inspections can lead to identification of illegal discharges. In 1996, this work was focused on facilities in the Oconee, Coosa, and Tallapoosa River basins in support of the basin planning process.

Aquatic Toxicity Testing

In 1982 EPD incorporated aquatic toxicity testing into selected industrial NPDES permits. In January 1995, EPD issued approved NPDES Reasonable Potential Procedures, which further delineated required conditions for conducting whole effluent toxicity (WET) testing for municipal and industrial discharges. All major permitted dischargers (flow greater than 1 MGD) are required to have WET tests run with each permit reissuance. Certain minor dischargers are also subject to this requirement if EPD determines that aquatic toxicity is a potential issue.

5.2.3 Data Analysis

Assessment of Use Support - General Procedures

EPD assesses water quality data to determine if water quality standards are met and if the waterbody supports its classified use. If monitoring data show that standards are not achieved, depending on the frequency with which standards are not met, the waterbody is said to be not supporting or partially supporting the designated use (see box).

Appendix E includes lists of all streams and rivers in the basin for which data have been assessed. The lists include information on the location, data source, designated water use classification, criterion violated, potential cause, actions planned to alleviate the problem, and estimates of stream miles affected. The lists are further coded to indicate status of each waterbody under several sections of the Federal Clean Water Act (CWA). Different sections of the CWA require states to assess water quality (Section 305(b)), to list waters still requiring TMDLs (Section 303(d)), and to document waters with nonpoint source problems (Section 319).

The assessed waters are described in three categories—waters supporting designated uses, waters partially supporting designated uses, and waters not supporting designated uses. Waters were placed on the partially supporting list if:

- The chemical data (dissolved oxygen, pH, temperature) indicated an excursion of a water quality standard in 11 percent to 25 percent of the samples collected.
- A fish consumption guideline was in place for the waterbody.

The partially supporting list also includes stream reaches based on predicted concentrations of metals at low stream flow (7Q10 flow) in excess of state standards as opposed to actual measurements on a stream sample. Generally, a stream reach was placed on the not supporting list if:

- The chemical data (dissolved oxygen, pH, temperature) indicated an excursion of a water quality standard in greater than 25 percent of the samples collected.
- A fish consumption ban was in place for the waterbody.
- Acute or chronic toxicity tests documented or predicted toxicity at low stream flow (7Q10) due to a municipal or industrial discharge to the waterbody.

Assessment of Use Support - Procedures for Specific Data Types

Additional specific detail is provided in the following paragraphs on analysis of data for fecal coliform bacteria, metals, toxicity, dissolved oxygen, fish/shellfish consumption advisories, and biotic data.

Fecal Coliform Bacteria

Georgia water quality standards establish a fecal coliform criterion of a geometric mean (four samples collected over a 30-day period) of 200 MPN/100 mL for all waters in Georgia during the recreational season of May through October. This is the year-round standard for waters with the water use classification of recreation. Although the standard is based on a geometric mean, most of the data for Georgia and other states is based on once per month sampling since resources are not available to conduct sampling and analysis four times per month. Thus, for the purposes of this report USEPA recommends the use of a review criterion of 400 MPN/100 mL to evaluate once per month sample results.

This density, 400 MPN/100 mL, was used to evaluate data for the months from May through October for all waters. For waters with the water use classification of recreation, this guidance criterion was used to evaluate data for the entire year. For waters classified as drinking water, fishing, or coastal fishing, the maximum Georgia standard for fecal coliform bacteria is 4000 MPN/100 mL (November through April). This standard was used to evaluate data collected during November through April for these waters. Waters were deemed not supporting uses when 25 percent of the samples had fecal coliform bacteria densities greater than the applicable review criterion (400 or 4000 MPN/100 mL) and partially supporting when 11 percent to 25 percent of the samples were in excess of the review criterion.

Metals

Since data on metals from any one given site are typically infrequent, using the general evaluation technique of 25 percent excursion to indicate nonsupport and 11 percent to 25 percent excursion to indicate partial support was not meaningful. Streams were placed in the nonsupporting category if multiple excursions of state criteria occurred and the data were based on more than four samples per year. With less frequent sampling, streams with excursions were placed on the partially supporting list. In addition, an asterisk appears beside metals data in those cases where there is a minimal database. A number of stream segments were listed based on one data point that exceeded a water quality standard. This approach is in accordance with USEPA guidance, which suggests any single excursion of a metals criterion be listed.

Toxicity Testing/Toxic Substances

Data from EPD toxicity testing of water pollution control plant effluents were used to demonstrate or predict toxicity in the receiving waterbody. Based on the effluent toxicity, receiving waters were considered not supporting when one or more tests gave a clear indication of instream toxicity and as partially supporting when based on predicted instream toxicity. Effluent data for toxic substances were used to designate either partial support or nonsupport based on whether instream corroborating data were available. When instream data were available, the stream was determined to be not supporting; when instream data were not available, the stream was listed as partially supporting.

Dissolved Oxygen, pH, Temperature

When available data indicated that these parameters were out of compliance with state standards more than 25 percent of the time, the waters were evaluated as not supporting the designated use. Between 11 percent and 25 percent noncompliance resulted in a partially supporting evaluation.

Fish/Shellfish Consumption Guidelines

A waterbody was included in the not supporting category when an advisory for “no consumption” of fish, a commercial fishing ban, or a shellfishing ban was in effect. A waterbody was placed in the partially supporting category if a guideline for restricted consumption of fish had been issued for the waters.

Biotic Data

A “Biota Impacted” designation for “Criterion Violated” indicates that studies showed a modification of the biotic community. Communities used were fish. Studies of fish populations by the DNR Wildlife Resources Division used the Index of Biotic Integrity (IBI) to identify affected fish populations. The IBI values were used to classify the population as Excellent, Good, Fair, Poor, or Very Poor. Stream segments with fish populations rated as “Poor” or “Very Poor” were included in the partially supporting list.

5.2.4 Assessment of Water Quality and Use Support

This section provides a summary of the assessment of water quality and support of designated uses for streams and major lakes in the Oconee River basin. Most of these results were previously summarized in the report *Water Quality in Georgia, 1996-1997* (Georgia DNR, 1998). A geographic summary of assessment results is provided by HUC in Figures 5-3 and 5-4.

Oconee River and Tributaries above Lake Sinclair (HUC 03070101) - Streams

Appendix E, Table E-1 summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (Georgia DNR, 1998).

Monitoring data was collected from 20 trend monitoring stations located within this subbasin during the 1996 period, two of which were on the mainstem. Historically, five trend monitoring stations have been sampled within this basin. The following assessment is based on data from these trend monitoring stations, as well as data from EPD special studies (e.g., intensive surveys) and samples collected by other agencies.

Data from the mainstem stations indicate that water quality conditions are being affected by both point and nonpoint source pollution.

Metals

Violations of water quality standards for metals occurred in one Oconee River mainstem segment and in 17 tributary segments. Metals standards were exceeded in the mainstem due to a water pollution control plant discharge. Lead, copper, zinc, and mercury standards were exceeded in tributary stream segments due primarily to nonpoint sources in eight segments and to urban runoff in six segments, and to water pollution control plant discharges in three segments.

Bacteria

The standard for fecal coliform bacteria was exceeded in two segments and 46 tributary segments. These exceedances were attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources, and animal wastes.

Erosion and Sedimentation

The water use classifications of fishing, recreation, and drinking water are potentially threatened in waterbodies by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, forestry practices, and agriculture. Thirteen stream segments in this subbasin are listed as not fully supporting designated uses due to poor fish communities. Erosion and loading of sediment to waterbodies might be a factor influencing fish communities in these areas.

Fish Tissue Quality

Guidelines for eating fish from the Upper Oconee River basin are listed in the following tables. The data shown in these tables are the new guidance published in the 1998-99 Georgia Sport Fishing Regulations and *1998 Guidelines for Eating Fish from Georgia Waters* booklet. This guidance is based on the EPA risk-based management approach and is revised each year if new data collected warrant a change.

Fish tissue quality in the rivers of this basin has been found to be good. No consumption restrictions are recommended for Slab Camp Creek. Consumption limits of one meal per week are recommended for largemouth bass in the Apalachee River and the Oconee River upstream of Barnett Shoals Dam, which also carries the same

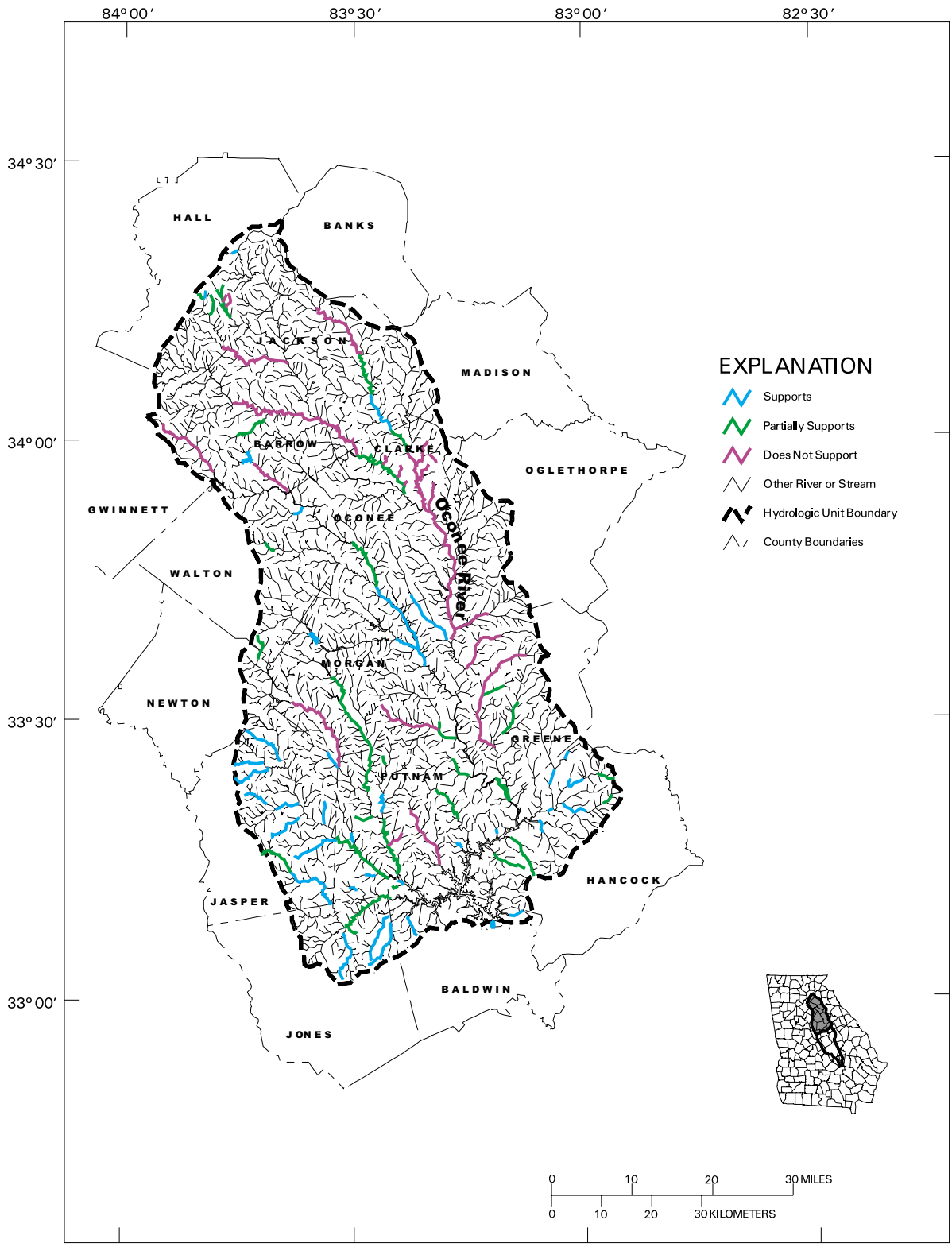

Figure 5-3. Assessment of Water Quality Use Support in the Upper Oconee River Basin, HUC 03070101

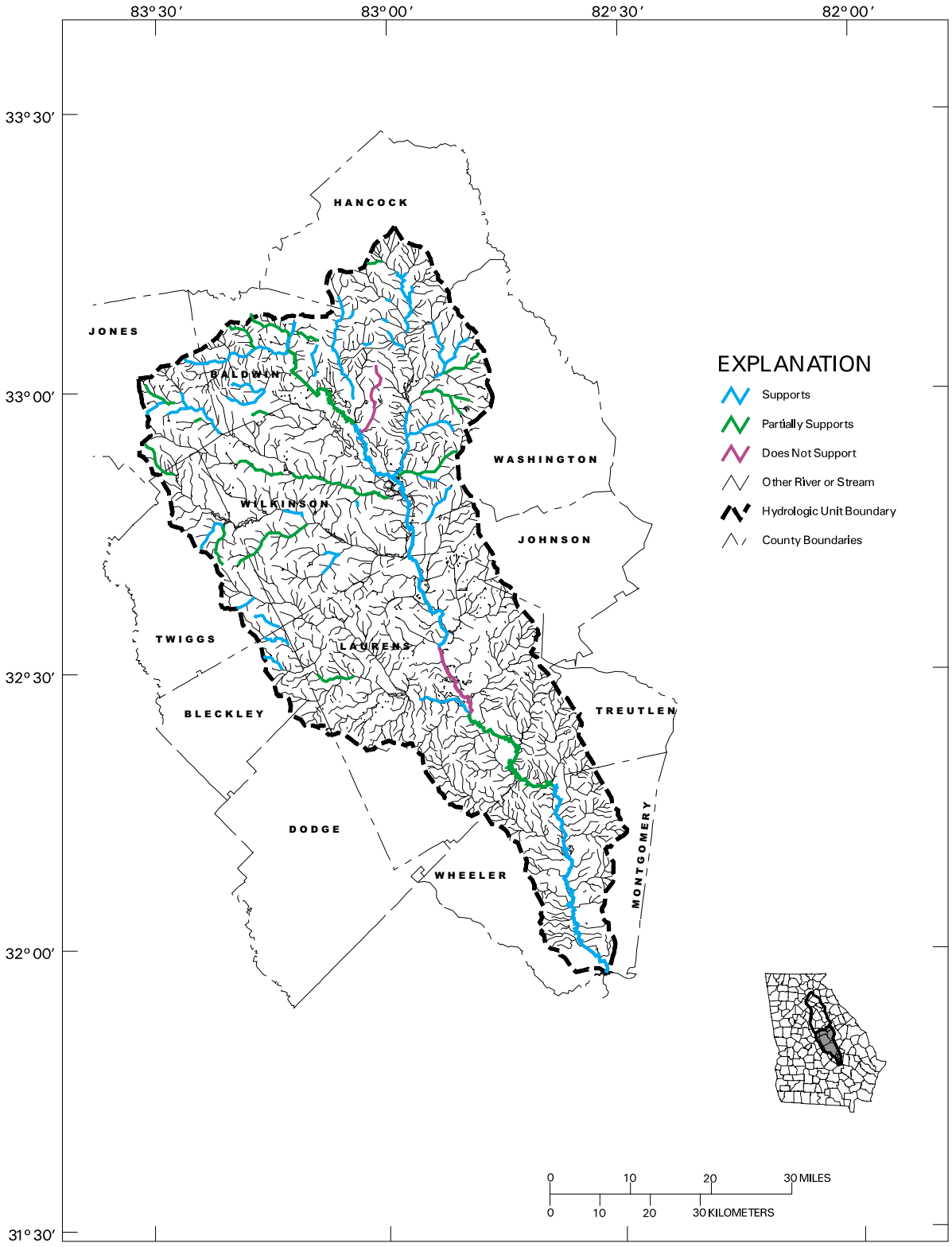

Figure 5-4. Assessment of Water Quality Use Support in the Lower Oconee River Basin, HUC 03070102

recommended consumption limit for silver redhorse. The recommendation for limited consumption in these locations is due to the presence of mercury in the fish flesh.

Fish Consumption Guidelines–Oconee River: Upstream of Barnett Shoals

Species	Site Tested	Recommendation	Chemical
Largemouth bass	Upstream of Barnett Shoals	1 meal per week	Mercury
Silver redhorse	See above	1 meal per week	Mercury

Fish Consumption Guidelines–Apalachee River

Species	Site Tested	Recommendation	Chemical
Largemouth bass	Apalachee Beach	1 meal per week	Mercury
Channel catfish	See above	No restrictions	

Fish Consumption Guidelines–Slab Camp Creek: Oconee County

Species	Site Tested	Recommendation	Chemical
Creek chub	Watson Spring Road	No restrictions	
Greater jumprock	See above	No restrictions	
Redbreast sunfish	See above	No restrictions	

Oconee River and Tributaries above Lake Sinclair (HUC 03070101) - Lakes

Lake Oconee

The Upper Oconee River basin contains Lake Oconee, the largest of the Georgia Power Company impoundments. Lake Oconee is a 21,000-acre hydroelectric reservoir located in Putnam, Morgan, Greene, and Hancock Counties. It was created in 1979 by construction of Wallace Dam on the Oconee River, upstream of Lake Sinclair. The nearest towns are Eatonton, Greensboro, Madison, and Milledgeville. The reservoir has a basin drainage area of 1,830 square miles. Other tributaries include the Apalachee River, Hard Labor Creek, and Richland Creek. At a normal elevation of 435.6 feet above mean sea level (MSL), Lake Oconee has a volume of 470,000 acre-feet, a maximum depth of 107 feet, and a shoreline length of 374 miles. The annual average outflow is 2,000 cfs. The Lake Oconee powerhouse contains six power generation units with a maximum capacity of 321,000 kilowatts.

The designated water use classification for the entire lake is Recreation. Land use in the Lake Oconee basin is primarily agriculture and forest. Point sources in the drainage area include treated municipal wastewater discharges from the cities of Monroe and Athens and treated wastewater discharges from Chicopee Manufacturing Company and Jefferson Mills.

Water quality studies have been performed including the Georgia DNR Clean Lakes Program Lake Classification Survey conducted in 1980 and 1981, the Georgia DNR Major Lake Monitoring Project conducted from 1984 through 1993, and the Georgia DNR Clean Lakes Water Quality Assessment Study conducted in 1989. The Georgia DNR also maintains ambient monitoring stations in the Oconee basin. The data from the Georgia DNR Major Lake Monitoring Project and the Georgia DNR Clean Lakes Water Quality Assessment Study found that the Carlson total trophic state index for this lake

generally ranged between <145 and 175. This indicated that the lake was eutrophic, typical of Georgia Piedmont Region impoundments.

Fish Consumption Guidelines–Lake Oconee

Species	Less than 12 inches	12-16 inches	Over 16 inches	Chemicals
Largemouth bass	No restrictions *	No restrictions *	1 meal per week	Mercury
Hybrid bass	No restrictions	No restrictions		
Channel catfish	No restrictions	No restrictions	No restrictions	
White catfish	No restrictions			
Black Crappie	No Restrictions			

** Only largemouth bass between 6 and 11 inches and 14 inches and longer may be legally possessed on Lake Oconee.*

Fort Yargo Lake

Fort Yargo Lake is located in Fort Yargo State Park, located just south of the city of Winder in Barrow County, Georgia. The park was opened in 1954 and the 260-acre Fort Yargo Lake was completed in 1967 under the Marbury Creek Watershed Project. Located within the boundaries of Fort Yargo State Park is Will-A-Way Recreation Area, which was specifically designed for a special group, disabled persons. Opened in 1970, it was the first facility of its kind in the United States. The state-designated use classification for Fort Yargo Lake is Fishing.

Fort Yargo Lake was included in the water quality studies performed as part of the Georgia DNR Clean Lakes Program Lake Classification Survey conducted in 1980 and 1981. The Carlson total trophic state index was 141 in 1980 and 138 in 1981. Impairment due to the presence of rooted aquatic macrophytes was listed as a problem in the past. Fecal coliform monitoring was conducted in 1996 and 1997 at the park swimming beach. The state standard of 200/100mL as a geometric mean of a minimum of four samples over a 30-day period (during the months of May through October) was met during both years.

Fish Consumption Guidelines–Fort Yargo Lake

Species	Site Tested	Recommendation	Chemical
Largemouth bass	Fort Yargo Lake	No restrictions	
Carp	See above	No restrictions	

Lakes Brantley and Rutledge

Lakes Brantley and Rutledge are impoundments of Hard Labor Creek, which flows into the Apalachee River 25 miles downstream. The surface area of Lake Brantley is 45 acres and for Lake Rutledge 75 acres. The Lake Brantley impoundment is upstream of Lake Rutledge. Both lakes are located in Hard Labor Creek State Park, located in Morgan and Walton Counties. The park came into being during the Great Depression when the National Park Service acquired 44 individual parcels of land that were joined, forming the 5,805-acre Hard Labor Creek Recreation Demonstration Area. The purpose of the site was to demonstrate the reclamation of marginal farmland for recreation. The task of land stabilization, along with early facility construction, as completed by the Civilian Conservation Corps and the Works Progress Administration. Beginning in 1934, thousands of pine trees were planted, dikes and terraces were built, roads were

constructed, and the lakebeds were cleared. In 1946 the Recreation Demonstration Area was given to the state of Georgia and became known as Hard Labor Creek State Park.

Lakes Brantley and Rutledge were sampled in 1980 and 1981 as part of the Georgia DNR Clean Lakes Program Lake Classification Survey. The Carlson total trophic state index was 192 in 1980 and 209 in 1981 in Lake Brantley, and 172 and 177, respectively, for Lake Rutledge. Impairment due excessive siltation was listed as a problem in Lake Brantley during the survey. The 1994-1995 305(b) report lists Lake Brantley as partially supporting the Fishing classification due to low dissolved oxygen, caused by nonpoint sources.

Fecal coliform monitoring was conducted in 1996 and 1997 at the three park swimming areas located on Lake Rutledge. These areas are Camp Rutledge Beach, Camp Daniel Morgan Beach, and Day Use Camp Beach. The state standard of 200/100 mL as a geometric mean of a minimum of four samples over a 30-day period (during the months of May through October) was met during both years at all three locations.

Fish Consumption Guidelines–Lake Rutledge: Hard Labor Creek State Park

Species	Less than 12 inches	12-16 inches	Over 16 inches	Chemicals
Largemouth bass		No restrictions		
Channel catfish	No restrictions	No restrictions		

Lake Sinclair

The Oconee River basin contains Lake Sinclair, the second largest of the Georgia Power Company impoundments. Lake Sinclair is a 15,330-acre hydroelectric reservoir located in Putnam, Baldwin, and Hancock Counties. It was created in 1953 by impoundment of the Oconee River near Furman Shoals. Lake uses are power generation, power plant cooling water, and recreation. The reservoir has a basin drainage area of 2,910 mi^2, 63 percent of which is from the Oconee basin upstream of Wallace Dam, the upstream boundary of the lake. Other tributaries include Murder Creek, Rooty Creek, Little River, Shoulderbone Creek, and Big Cedar Creek. At normal elevation Lake Sinclair has a lake volume of 330,000 acre-feet, a mean depth of 21.7 feet, a maximum depth of 89.9 feet, and a shoreline length of 417 miles. The annual average outflow is 3,150 ft^3/s. The designated water use classification for the entire lake is Recreation.

An additional feature of Lake Sinclair is a limited warm-water effluent created by Plant Harlee Branch, a multiunit, 1,539,000-kilowatt, coal-fired steam electric generating plant owned by the Georgia Power Company. Reservoir water used in a once-through cooling system is taken from the Little River embayment of Lake Sinclair and discharged into the Beaverdam Creek embayment. In 1991 and 1992 Georgia Power conducted a comprehensive hydrothermal and limnological study of Lake Sinclair to determine the impact of this thermal discharge. Based on this study Georgia Power is constructing an additional water cooling system to mitigate the effects of its discharge. A new permit granting this facility a variance from Georgia's 90 °F maximum temperature limit is currently under public review.

Other water quality studies have been performed including the EPA National Eutrophication Survey conducted in 1973-1974, the Georgia DNR Clean Lakes Program Lake Classification Survey conducted in 1980-1981, the Georgia DNR Major Lake Monitoring Project conducted from 1984 through 1993, and the Georgia DNR Clean Lakes Water Quality Assessment Study conducted in 1989. The EPD also maintains ambient monitoring stations in the Oconee basin, including stations on Little River and Murder Creek.

The 1973-1974 EPA National Eutrophication Survey reports indicated the lake was eutrophic. The 1991-1992 Georgia Power study report indicated the lake continued to be eutrophic, typical of Georgia Piedmont Region impoundments. The Georgia 1996-1997 305(b) report lists the Little River arm of Lake Sinclair as partially supporting the designated use of Recreation due to pH criteria violations. The cause given is nonpoint sources.

Fish Consumption Guidelines–Lake Sinclair

Species	Less than 12 inches	12-16 inches	Over 16 inches	Chemicals
Largemouth bass		No restrictions	No restrictions	
Hybrid bass	No restrictions			
Catfish	No restrictions	No restrictions	No restrictions	
Black crappie	No restrictions			

Lakes Bennett and Shepard

Lakes Bennett and Shepard are a part of the Georgia DNR Marben Public Fishing Area (PFA), located in the Charlie Elliott Wildlife Center in Jasper and Newton Counties. The Charlie Elliot Wildlife Center features 21 managed ponds totaling 295 acres that range in size from 1 to 95 acres.

Bennett Lake is a 69-acre impoundment of Murder Creek. It features a largemouth bass, bluegill, crappie, channel catfish, and yellow perch fishery. Largemouth bass and crappie are the most frequently caught fish. A concrete ramp on the upper end of Lake Bennett provides easy access for boaters. There is unimproved bank access and a picnic area along much of the west side of the lake.

Shepard Pond is an 18-acre impoundment of Shepard Creek and is known for producing large bream (bluegill and redear sunfish). It also has a largemouth bass and channel catfish fishery. Handicapped-accessible facilities, including a picnic area, restroom, and improved boat ramp, are located on Shepard Pond.

Fish Consumption Guidelines–Lake Bennett: Charlie Elliott Wildlife Center

Species	Less than 12 inches	12 - 16 inches	Over 16 inches	Chemical
Largemouth bass		No restrictions	1 meal per week	Mercury

Fish Consumption Guidelines–Shepard Lake: Charlie Elliott Wildlife Center

Species	Less than 12 inches	12 - 16 inches	Over 16 inches	Chemical
Largemouth bass		No restrictions		

Oconee River Basin and Tributaries Below Lake Sinclair (HUC 03070102)

Appendix E, Table E-2, summarizes the determination of support for designated uses of all assessed rivers and streams within this hydrologic unit (Georgia DNR, 1998).

Monitoring data were collected from 12 trend monitoring stations located within this subbasin during the 1996 period, seven of which were on the Oconee mainstem.

Historically, five trend monitoring stations have been sampled within this basin. The following assessment is based on data from these trend monitoring stations as well as data from EPD special studies (e.g., intensive surveys) and samples collected by other agencies.

Data from the mainstem stations indicate that water quality conditions are being affected by nonpoint source pollution.

Metals

No violations of water quality standards for metals occurred in mainstem Oconee River segments. Mercury standards were exceeded in one tributary segment due to nonpoint sources.

Bacteria

The standard for fecal coliform bacteria was not met in two Oconee River mainstem segments and in one tributary segment. These exceedances were attributed to a combination of urban runoff, septic systems, sanitary sewer overflows, rural nonpoint sources, and animal wastes.

Erosion and Sedimentation

The water use classifications of fishing, recreation, and drinking water are potentially threatened in waterbodies by erosion and loading of sediment, which can alter stream morphology, impact habitat, and reduce water clarity. Potential sources include urban runoff and development (particularly construction), unpaved rural roads, forestry practices, and agriculture. Fourteen stream segments in this subbasin are listed as not fully supporting designated uses due to poor fish communities. Erosion and loading of sediment to waterbodies might be a factor influencing fish communities in these areas.

Fish Tissue Quality

Guidelines for eating fish from the Lower Oconee River basin are listed in the following tables. The data shown in these tables are the new guidance published in the 1998-99 Georgia Sport Fishing Regulations and *1998 Guidelines for Eating Fish from Georgia Waters* booklet. This guidance is based on the EPA risk-based management approach and is revised each year if new data collected warrant a change.

The fish quality in the lower Oconee River has been found to be excellent. No fish consumption limitations are recommended.

Fish Consumption Guidelines–Oconee River: Baldwin/Wilkinson Counties

Species	Site Tested	Recommendation	Chemical
Flathead catfish	Milledgeville to Dublin	No restrictions	

Fish Consumption Guidelines–Oconee River: Laurens County

Species	Site Tested	Recommendation	Chemical
Largemouth bass	Interstate-16	No restrictions	
Spotted sucker	See above	No restrictions	
Channel catfish	See above	No restrictions	

5.2.5 Assessment of Fish and Wildlife Resources

Detailed, HUC-level assessments of fish and wildlife resources in the Oconee River basin were not available at the time of compilation of the basin plan. However, rough, basin-scale assessments of fish and wildlife resources have been developed as part of the RiverCare 2000 Georgia Rivers Assessment (EPD, 1998). These results are summarized below.

Ecologically Important Fish Resources

Georgia's fishery resources depend on healthy streams and are part of a diverse community of game and non-game species. These communities by definition include vertebrates like fishes and invertebrates like mussels and aquatic insects. A complete community with all species that naturally occurred in a particular river system is irreplaceable. Only a few species can be propagated and restocked into nature. The life found in Georgia's rivers depends absolutely on the integrity of aquatic habitat, which in turn directly reflects the conditions within the rivers' entire upstream watersheds. Healthy aquatic ecosystems can provide sustainable commercial and recreational fisheries which are valuable in their own right. The effects often associated with the pursuit of these fisheries adds even more value to Georgia's local economies.

The Georgia Rivers Assessment work group evaluated river segments and associated tributaries according to the composition of fish and mussel species, the quality of habitat, and the characteristics of the particular fishery. The assessment considered chiefly those river corridors lying downstream of the point at which the rivers attained an average annual discharge of 400 cfs. However, portions of ecologically-valuable rivers that might have a smaller average annual flow than 400 cfs were also evaluated.

The work group established three value classes to rank river segments:

Superior	Non-regulated stream, near wilderness, not immediately influenced by large municipalities, may contain important faunal assemblages.
Outstanding	Non-regulated stream with important faunal assemblages or important habitats.
Significant	Can include regulated stream reaches with important faunal assemblages or important habitats.

Within the Oconee basin, 282 river miles were evaluated. All 282 miles were rated Significant; no segments were rated Superior or Outstanding.

The major threats to ecologically important fish resources come from nonpoint source pollution and the effects of other human activities in the environment. Clearing vegetation, disturbing earth without adequately controlling the movement of sediment, increasing impervious surface, and related activities in a watershed can alter water quality and patterns of stream discharge. Altering river channels, by dredging or by removing snags which furnish many prey organisms for fish, also reduces the quality and quantity of fish habitat. These activities lower the value of streams for fish populations.

Another significant threat to Georgia's fish species is the introduction of exotic, or foreign species. Many introduced species, such as flathead catfish, compete with native fish for food and cover, take them as food, or parasitize them. If the new species are so successful that they reduce or eliminate the native population, they can significantly reduce the river's fishery biodiversity as well.

Recreational and Commercial Fish Resources

The Georgia Rivers Assessment work group also evaluated river segments from the point of view of commercial or sport-fishing uses. To identify the important recreational and commercial fishing resources, the work group averaged scores of fishery demand and uniqueness for segments of major rivers and their associated tributaries. This assessment provides a snapshot of current recreational and fishery conditions within major river segments. Evaluation made use of two criteria, weighted equally:

- Fishery uniqueness: The lack of an alternative commercial or recreational fishery anywhere within the state (3 points), within one of the seven fisheries management regions established by the Georgia DNR (2 points), or locally within a 50-mile radius of the resource under evaluation (1 points).
- Fishery demand: The popularity of the fishery, when compared to a similar fishery elsewhere in the state and measured by standard indicators of fishing pressure such as angler-days or the length of the waiting period for limited-entry fisheries. (Scoring: 1-3 points)

Stream segments were identified as "Qualifying" if at least one of the two scores was at least 2. Of the miles evaluated in the Oconee basin, 275 miles were rated as Qualifying.

Reservoir fisheries are also important within the Oconee basin. Lake Sinclair provides good fishing for largemouth bass, crappie, channel catfish, and other species. Lake Oconee provides a fishery for largemouth bass, crappie, white bass, and other species.

The major threats to recreational and commercial fisheries vary by river segment. In general, however, two of the major threats are nonpoint-source runoff from urban areas and disturbed lands, and the introduction of exotic, non-native aquatic species into Georgia's rivers.

Wildlife Resources

Wildlife is part of the web of life and is necessary for human survival. Its presence enriches humans aesthetically and spiritually. Populations of some species serve as indicators of environmental health. Various species provide food and pollination services and may be a source of pharmaceutical chemicals. Predators, such as hawks and foxes, keep in check populations of mice, rats, and other animals that are considered agricultural pests.

Wildlife also provides recreation to the many people who enjoy watching wildlife or hunting. According to recent surveys, 82 percent of Georgians actively observe wildlife or hunt. These activities generate economic activity from the sale of hunting licenses; of equipment and supplies used to identify, hunt, feed, and watch wildlife; and of services such as food, lodging, outdoor guides, and the maintenance and repair of equipment used in wildlife-oriented recreation.

The Georgia Rivers Assessment Wildlife Resources Work Group evaluated wildlife habitat quality, which it defined to include the expected or observed diversity of wildlife species within the river corridor, and the general condition of terrestrial and wetland habitats within the river corridor. The area under consideration included the stream channel and adjoining lands within 3.1 miles of the river bank. The work group defined high-quality wildlife resource areas as those that provide habitat for a high diversity of wildlife species. These area may include habitat that has declined significantly or is rare, or that supports species of special conservation concern. The assessment was limited to

perennial streams downstream of the point at which the stream reaches an average annual discharge of 400 cfs or greater.

The evaluation criteria placed equal emphasis on four measures of wildlife resource quality, each of which contributed a maximum of 25 points to a river segment's final score. These were as follows:

- Diversity of species and natural habitats in the river corridor
- Habitat value for species of special concern
- Percentage of river corridor in natural vegetation
- Habitat fragmentation in the river corridor

Segments were rated as Superior (80-100 points), Outstanding (61-79 points), Significant (41-60 points), and Other (less than 41 points). Within the Oconee River basin, 290 miles of river corridor were rated as Outstanding and 50 miles as Significant. No segments were rated as Superior.

The major threats to wildlife resources are a variety of land-use changes, including residential, industrial, silvicultural, and agricultural development. The effects on wildlife resources vary, both quantitatively and qualitatively, depending on the types of land use in a region, the types of natural habitats present, and the amount of development. Changes to native wildlife populations resulting from the conversion of natural forest habitat to short-rotation silvicultural stands are perhaps less obvious than those resulting from conversion to intensive agricultural or industrial use, but are nonetheless significant. Overall, the trends for wildlife habitat quality in Georgia's river corridors include continued fragmentation of natural habitats, loss of forested riparian buffers, and increasing prevalence of disturbed and early-successional plant and animal communities.

Within the Oconee River basin, some land area is controlled by the Oconee National Forest. The Oconee National Forest publishes and regularly updates a Land and Resource Management Plan which documents specific objectives and strategies for the management of wildlife habitat.

References

EPD. 1998. Georgia Rivers: An Initial Assessment. Environmental Protection Division, Georgia Department of Natural Resources, Atlanta, GA.

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